CLAIMS

An antenna structure comprising: 1. 1

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at least one antenna element, the at least one antenna element having at 3

least one taper; and

a symmetrical ground plane coupled with the at least one antenna

element. 7

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2. The antenna structure of Claim 1, wherein the at least one antenna

element comprises a travelling wave antenna supporting a phase velocity 2

greater than the speed of light 3

3. 1

The antenna structure of Claim 1, wherein the taper comprises a linear

profile, a linear constant profile, a broken-linear profile, an exponential profile, 2

an exponential constant profile, a tangential profile, a step-constant profile, or a

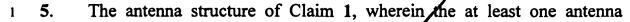
parabolic profile. 4

The antenna structure of Claim 1, wherein the antenna structure supports 4. 1

a cigar-like directional three-dimensional beam pattern and a butterfly wing-2

like directional three- dimensional beam pattern. 3





- 2 element is positioned at an angle from the symmetrical ground plane.
- 1 6. The antenna structure of Claim 5, wherein the angle is about 90 degree
- with respect to the x-, y- and z- axes,
- 7. The antenna structure of Claim 1, wherein the at least one antenna
- 2 element is coupled with the symmetrical ground plane by means of an
- 3 unbalanced impedance.
- 1 8. The antenna structure of Claim 7, wherein the unbalanced impedance
- 2 comprises a coaxial cable.
- 1 9. The antenna structure of Claim 7, wherein a first conductor of the
- 2 unbalanced impedance mechanically couples the at least one antenna element
- with the symmetrical ground plane.
- 1 10. The antenna structure of Claim 1, wherein the symmetrical ground plane
- 2 is disk shaped.

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11. An antenna structure comprising:

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an array of at least two antenna elements, each antenna element having at least one taper;

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a symmetrical ground plane; and

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an unbalanced impedance for coupling the array of at least two antenna elements with the symmetrical ground plane.

1 12. The antenna structure of Claim 11, wherein at least one antenna element

of the array comprises a travelling wave antenna supporting a phase velocity

3 greater than the speed of light.

1 13. The antenna structure of Claim 11, wherein the taper of at least one

2 antenna element of the array comprises a linear profile, a linear constant

profile, a broken-linear profile, an exponential profile, an exponential constant

4 profile, a tangential profile, a step-constant profile, or a parabolic profile.

1 14. The antenna structure of Claim 11, wherein each antenna element of the

2 array supports a cigar-like directional three-dimensional beam pattern and a

3 butterfly wing-like directional three- dimensional beam pattern.

- 1 15. The antenna structure of Claim 11, wherein each antenna element of the
- 2 array is positioned at an angle from the symmetrical ground plane.
- 1 16. The antenna structure of Claim 15, wherein the angle for each antenna
- element is about 90 degree with respect to the x-, y- and z- axes.
- 1 17. The antenna structure of Claim 11, wherein the unbalanced impedance
- 2 comprises a coaxial cable.
 - 18. The antenna structure of Claim 17, wherein a first conductor of the unbalanced impedance mechanically couples each antenna element of the array with the symmetrical ground plane.
- 1 19. The antenna structure of Claim 11, wherein the symmetrical ground plane is disk shaped.
- 1 20. The antennal structure of Claim 11, further comprising a slow wave
- 2 antenna to widen the directivity of the antenna structure.

- 22. The apparatus of Claim 21, wherein the at least one antenna element 1 supports a cigar-like directional three-dimensional beam pattern and a butterfly
- wing-like directional three-dimensional beam pattern. 3
- The antenna structure of Claim 21, wherein the angle is about 90 degree 23. 1
- with respect to the x-, y- and z- axes. 2

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- Peterson 18
- 24. The antenna structure of Claim 21, wherein the unbalanced impedance 1
- comprises a coaxial cable. 2



- The antenna structure of Claim 21, wherein a first conductor of the **25**. 1
- unbalanced impedance mechanically couples the at least one antenna element 2
- with the symmetrical ground plane. 3